REMARKS

Claims 1-8 are pending. By this Amendment, Claim 1 is amended. Support for the amendments and newly claimed subject matter is located in the originally filed application, such as, for example only, in drawing Figures 1A-7. Therefore, Applicants respectfully submit no new material is presented herein.

Personal Interview

Applicants appreciate and respectfully acknowledge the courtesies extended to Applicants representative during the personal interview conducted October 26, 2005. The points discussed during the interview are incorporated herein.

Entry of Response is Proper

Entry of this Amendment is proper under 37 C.F.R. §1.116 since the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not raise any new issues requiring further search and/or consideration on the part of the Examiner; (c) satisfy a requirement of form asserted in the previous Office Action; (d) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The Amendment is necessary and was not earlier presented because it is made in response to objections raised in the Final Rejection. Entry of the Amendment is thus respectfully requested.

Claim Rejection – 35 U.S.C. §103

Claims 1-8 are rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 4,000,392 to Banas et al. in view of U.S. Patent Application Publication No. 2004/0200813 to Alips et al. ("Alips"). Applicants respectfully traverse the rejection.

Claim 1 recites a through weld method using high energy beams, the method including the steps of positioning a first aluminum or aluminum alloy welding base metal opposite a source of the energy beams, the first welding base metal having a first surface and a second surface opposite the first surface; disposing a second aluminum or aluminum alloy welding base metal beneath the first welding base metal, the second welding base metal having a first surface and a second surface opposite the first surface, wherein the second surface of the first welding base material ***directly*** abuts the first surface of the second welding base metal; and supplying a shield gas to form an ambience over a submerged-scar projecting from a welding site defined on the second surface of the second welding base metal, as well as the shield gas to cool and push up a scar projection from the welding site on the second surface of the second welding base metal, wherein a vertical height of a submerged scar is reduced.

As explained in the Response dated May 25, 2005, the invention recited by Claim 1 provides many benefits due to the application of pressure from the flowing gas pushing up a weld pool so that beads do not come down therefrom and so that a rather flat submerged-scar is kept, and that the post production step of removing the projection of the beads is also rendered unnecessary or is rarely required. Also, there is no need to refill the welding metal to the molten pool, which is recessed from the non-welded surface. Also, confining the overlap welding (stacked welding) to aluminum and aluminum alloy welding is acceptable. Moreover, the pressure is listed in two categories, the first category being a static pressure wherein the mounting stage is used and a dynamic pressure being the second category, wherein a gas nozzle is used in the open air. Additionally, the inert gas and the cooling enforced by the gas flow assist avoids contamination of the molten metal in the welding and reduces the projection of the beads. Finally, the motion of the shield gas nozzle is effective in keeping the flat submerged-scar due to the pressure against the beads and results in quick cooling of the molten metal so that the generation of beads is effectively suppressed.

As noted in the Response of May 25, 2005, Banas fails to disclose or suggest disposing a second workpiece above or below the lone (i.e., single) workpiece (16) disposed between the clamp (22) and weld fixture (20) let alone in a direct abutment type arrangement.

Applicants note Alips teaches placing first and second metal sheets (1 and 2) in an abutting relationship. See Figures 1-2 of Alips. However, Applicants note the first and second metal sheets 1 and 2 have a central metal part 1a and 2a that is sandwiched between coating layers 1b and 1c and 2b and 2c, respectively, wherein each coating layer 1b, 1c, 2b and 2c has an evaporation temperature that is below the melting point of the material (i.e., the central metal part 1a and 2a) of each sheet 1 and 2. Applicants note the central metal parts 1a and 2a of the metal sheets 1 and 2, respectfully are not placed in a directly abutting relationship. Rather, the aluminum ***coating*** 1c of the first metal sheet 1 is in a directly abutting relationship with the aluminum ***coating*** 2b of the second metal sheet 2. As a result, while the metal sheets 1 and 2 are being welded, vapor from the coating material forms at the interface between the two sheets 1 and 2, and the vapor rises to the surface of weld pools 18 and 19 formed in a region of overlap between the two sheets 1 and 2. Due to the increase in the area of the weld pools 18 and 19, the degassing area for the coating material vapor is increased. A nozzle 20 is then required to remove the coating material vapor. As is clear from the above, the base or central part 1a and 2a of each sheet 1 and 2 are not placed in a directly abutting relationship as ***the coatings*** 1c and 2b of the sheets 1 and 2 are actually abutting. Moreover, once the coatings 1c and 2b are vaporized upon welding, the remaining abutting or joined central parts 1a and 2a of each sheet 1 and 2 are metal and not aluminum or aluminum alloy as are the first and second welding base metals of Claim 1.

Claim 1 also recites supplying a shield gas to form an ambience over a submerged-scar projecting from a welding site defined on the second surface of the second welding base metal. Applicants respectfully note that Alips does not disclose or suggest a submerged-scar or any other such feature of the weld pools 18 and 19 projecting from a lower surface of the metal sheet 2. Applicants further note Alips specifically discloses the metal sheet 2 has a coating layer 2c provided on the lower surface. Applicants note Banas appears to teach or at least suggest the metal melt 16 having a submerged-scar projecting from a lower surface of the lone workpiece 16. However, Applicants respectfully note Banas, while removing or limiting the amount of impurities at a weld site, does not appear to disclose or suggest the shield gas 36 pushing the scar projecting from the lower surface of the lone workpiece 16 wherein a vertical height of the scar is reduced.

Furthermore, as discussed during the interview, there is a difference in effect from the viewpoint of cooling by gas. In general, when a gas stream having a lower temperature than that of a molten metal is brought into contact with the molten metal, the gas stream cools and solidify the surface of the molten metal. In the present invention, cooling (solidification) by the gas stream (page 4, lines 15-16, page 13, line

29) has preferable effects in that the formation of penetration becomes difficult, and even when the weld pool penetrates to the bottom face, the hole on the bottom is kept small. This cooling effect, together with the push-up effect, suppresses the formation of beads, and the height of the submerged scar is reduced or kept to zero. In contrast, cooling (solidification) by the gas stream acts against the purpose in Banas and Alips.

Since Banas deals with butt welding, it is preferable that the weld zone reach the bottom face of the work piece (i.e., the weld zone penetrate through the work piece to the bottom side) in order to obtain firm welding. However, the shield gas supply cools the bottom of the work piece, and thus hinders the penetration of the weld zone. Applicants note that although there is a description regarding cooling effect in column 10, lines 6-20 in Banas, the cooling is not by the gas flow, but by conductivity of heat sink during solidification. In Alips, the gas is provided to the weld pool from the upper side. This gas stream has two opposite effects at the same time: removing impurity vapor from the weld pool (positive effect), and cooling the surface of the weld pool, which hinders the removal of the impurity vapor (negative effect).

Further, in Banas, the purpose is to obtain better quality welding by enhancing the purity of the weld zone, and a gas is provided to the chamber (channel) in order to prevent the reaction between the heated metal and the atmosphere containing impurities, and to remove impurities from the molten metal. On the other hand in the present invention, better quality welding is obtained by controlling the shape of welded part, and a gas is provided to the chamber in order to cool and push up the scar projection to thereby suppress beads formation.

Moreover, Applicants note that in Alips, the purpose is to obtain better quality welding by removing vapor originating from coating material to prevent pore formation. A gas is provided from the beam radiation side (upper side) in order to degas the coating material vapor from weld pool. On the other hand in the present application, better quality welding is obtained by controlling the shape of welded part, and a gas is introduced from the bottom side in order to cool and push up the scar projection to thereby suppress beads formation.

To establish *prima facie* obviousness, each and every feature of the rejected claim must be taught or suggested by the applied art of record. See M.P.E.P. §2143.03. As explained above, Banas and Alips, either alone or in combination, fail to teach or suggest each and every feature recited by Claim 1. Therefore, Applicants respectfully submit Banas and the applied Banas/Alips combination do not render obvious the subject matter recited by Claim 1. Accordingly, Applicants respectfully submit Claim 1 should be deemed allowable over the applied Banas/Alips combination.

Claims 2-8 depend from Claim 1. It is respectfully submitted that these seven (7) dependent claims be deemed allowable for the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

Applicants respectfully request withdrawal of the rejection.

Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejection, allowance of Claims 1-8, and the prompt issuance of a Notice of Allowability are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event that the filing of this paper is not deemed timely, Applicants petition for an appropriate extension of time. Any petition fee for the extension of time and any other fees that may be required in relation to this paper can be charged to Deposit Account No. 01-2300, **referencing Docket No. 106145-00068**.

Respectfully submitted,

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